

LECTURE # 10

TOPIC OF DISCUSSION COORDINATE SYSTEMS

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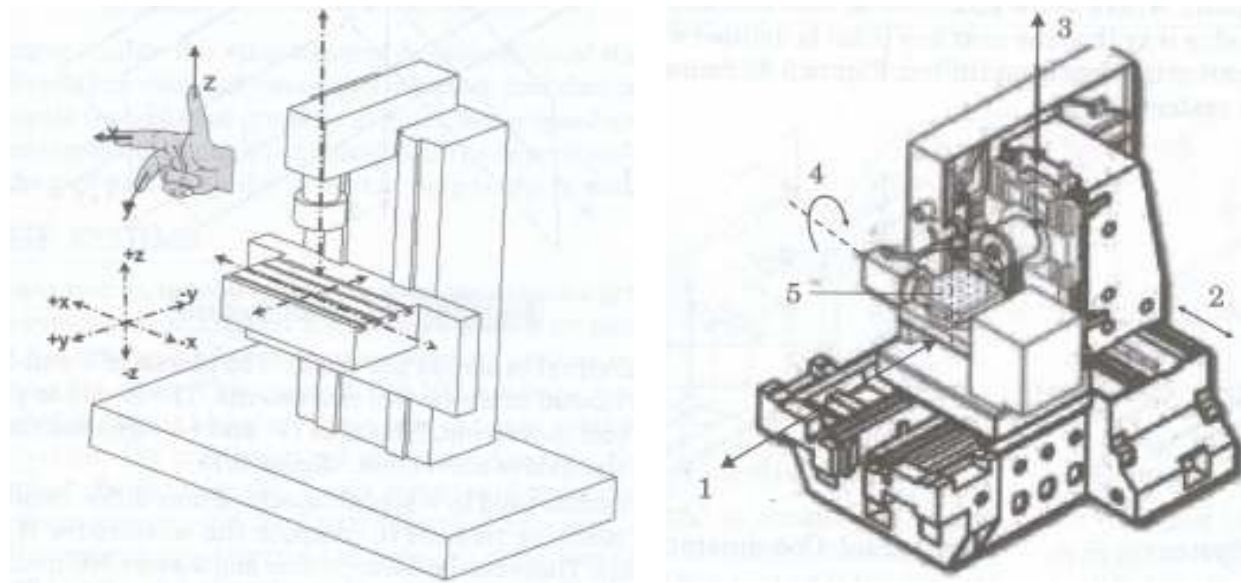
COORDINATE SYSTEMS

- The coordinate system is used to provide a means of locating the tool in relation to the workpiece
- A system of rectangular coordinates is used for measuring NC machine axes movement
- In this type of system any point or section is located along three mutually perpendicular axes
- The concept fits NC machine tools perfectly because generally their construction is based on three axes of linear motion i.e. X, Y, Z & one or two rotation
- On NC vertical machining centre, the X-axis represents horizontal movement of the table, Y-axis represents cross movement of the table (towards or away from column) and the Z-axis defines the vertical movement of spindle
- In this system all positions described in terms of distances from common point called the origin and measured along three mutually perpendicular axes



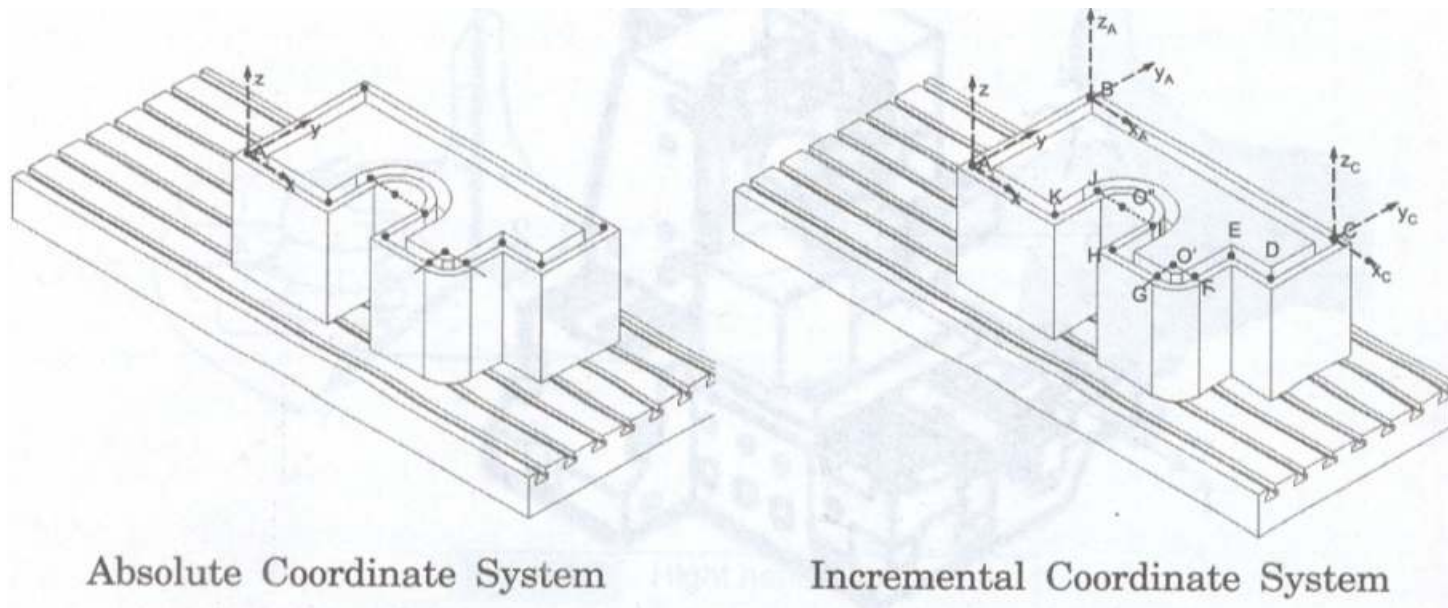
COORDINATE SYSTEMS

- For CNC programming purpose, the origin point is commonly called the program zero point (also called work zero, part zero or program origin)
- If the programmer wishes the tool to be sent to a position 10 mm to the right of the program zero point, X10.0 is the command. If he wishes the tool to move to position 10 mm above the program zero point then Z10.0 is used
- The coordinate system used by a specific machine may differ; hence programmer must go through the machine manual to compute the coordinates of the part before writing the part program
- There can be 3-axis, 4-axis or 5-axis CNC machines depending upon the complexity of the work piece



COORDINATE SYSTEMS

- Part program is written with some reference point. This reference point can be fixed point or floating normally called as Absolute and Incremental coordinate systems respectively
- Absolute coordinate systems uses only one origin to designate all the key-points on the work-piece path where as the Incremental coordinate systems shifts the coordinate systems in such a way that the next key point is defined with respect to the last key-point origin where the part origin has been shifted



COORDINATE SYSTEMS

- EXAMPLE

Point	Absolute		Incremental	
	X	Y	X	Y
P1	0	0	0	0
P2	0.5	0.5	0.5	0.5
P3	1.25	0.5	0.75	0
P4	1.75	1.5	0.5	1.0
P5	0.75	1.75	-1.0	0.25
P6	0	0	-0.75	-1.75
Sum			0.0	0.0

